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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/851,952	05/09/2001	Theodore H. Fedynyshyn	101328-0151	4043
21125	7590	12/23/2003	EXAMINER	
NUTTER MCCLENNEN & FISH LLP WORLD TRADE CENTER WEST 155 SEAPORT BOULEVARD BOSTON, MA 02210-2604			WALKE, AMANDA C	
			ART UNIT	PAPER NUMBER
			1752	

DATE MAILED: 12/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/851,952	FEDYNYSHYN, THEODORE H.	
	Examiner	Art Unit	
	Amanda C Walke	1752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

P riod for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) _____ is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 19, 50, 51 and 53-55 is/are allowed.
- 6) ☒ Claim(s) 18, 20-28, 52, and 56-59 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
 a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/24/2003 has been entered.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 18, 20-24, 52, and 56-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barclay et al (6,306,554).

Barclay et al disclose polymers containing oxygen and sulfur alicyclic units for use in photoresist compositions for imaging at short wavelengths (such as 248 nm or less, preferably 200 nm or less [~193nm], or even as low as 157 nm; column 12, line 65 to column 13, line 4). Preferred alicyclic groups for use in the polymer include norborene groups. The use of such groups on a photoresist composition is advantageous because it results in increased plasma etch resistance, improved substrate adhesion, and the formation of highly resolved relief images.

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Even more preferred are polymers that consist of the alicyclic units and maleic anhydride units (column 9, lines 42-64 and example 1). The photoresist compositions also comprise a resin binder, a photoacid generator (PAG), a solvent, and a base additive. Preferred PAG's include sulfonate compounds and other known PAG's. Preferred base additives include TBAH, TBAL, and hindered amine compounds (especially preferred for resists imaged at 193 nm), although other conventional compounds may be employed in the invention of the reference. The base additive may be used in small amounts such as about 0.03 wt % to about 5 wt % (column 14, line 52 to 16, line 26 and example in column 21). The prepared compositions are employed in a method of making a pattern by coating the resist onto a substrate, drying the resist, exposing the resist through a mask, post-baking the resist, then developing the resist to form the relief image (column 16, lines 27-67). In the examples of the reference the PAG (triphenylsulfonium triflate) and the base additive (triisopropanol amine) are employed in amounts of 0.52 wt% and 0.03 wt % respectively. When calculated, the molar concentration ratio of the 2 compounds in the example is about 0.1. However, even though there is no broader teaching of the amount of PAG to be added, the base may be added in an amount of from 0.03-5 wt %, it would have been obvious to one of ordinary skill in the art to use any amount within the taught range. The molar concentration ratio range based upon the broadest teaching of the base would be about 0.1 to about 20 which would meet the limitations of the present claims which require that the ratio be about 0.5, 0.6, or 1, and the limitation of the present claim 20 requiring that the molar concentration ratio is less than about 1. Therefore it would have been obvious to one of ordinary skill in the art to prepare the material of the reference using any amount of base within the taught range, which results in molar concentration ratio within the range of 0.1 to about 20 that overlaps

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that required by the present claims, with reasonable expectation of achieving a material having increased plasma etch resistance, improved substrate adhesion, and the formation of highly resolved relief images.

3. Claims 18, 20, 21, 23, 24, 52, and 56-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barclay et al in view of Thackeray et al (5,879,856).

Barclay et al has been discussed above. Although the present claims have been rejected under Barclay et al alone, they are alternatively rejected under Barclay et al in view of Thackeray et al.

Thackery et al disclose chemically amplified resist compositions comprising a resin binder, an acid generator, and a photospeed control agent (base additive) (see abstract). The reference teaches that suitable organic bases or photospeed control agents include TBAH and organic amines. The preferred PAG's include sulfonate salts and onium salts. The photospeed control agent is added in an amount of preferably about 1 % to 20 % by weight of the PAG compound. The resist may be tested for photospeed, and the photospeed can be adjusted to provide a photospeed of a desired value. The photoresist composition will contain a sufficient concentration of the photospeed control agent so that there will be only an about 1-2 % or less difference in photospeed exists between batches (column 5, lines 15- 55, column 6, lines 1-7, column 7, line 12- column 8, line 60). The amount of the agent is a result effective variable, therefore given the teachings of the reference, one of ordinary skill in the art would have been motivated to optimize the amount of the photospeed control agent to achieve a desired photospeed value and/or to achieve a more uniform photospeed between batches of photoresist (*In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980)). When calculated, the molar

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concentration ratio of the examples, which contain 0.131 g of the PAG and 0.013 g of the photospeed control agent, (see column 11) is 0.212. However, even though there is no broader teaching of the amount of PAG to be added, the reference teaches that the photospeed control agent may be added in an amount of from about 1 to 20 % by weight of the PAG. Therefore, it would have been obvious to one of ordinary skill in the art to use any amount within the taught range. The range of the molar concentration ratio would be 0.0212 to 0.42 based upon the broadest teaching of the amount of photospeed control agent, which would meet the limitations of the present claims which require that the ratio be about 0.5 or 0.6, and the limitation of the present claim 20 requiring that the molar concentration ratio is less than about 1.

Given the teachings of the Thackeray et al reference that the amount of photospeed control agent is a result effective variable and that one of ordinary skill in the art would have been motivated to optimize the amount of the photospeed control agent to achieve a desired photospeed value and/or to achieve a more uniform photospeed between batches of photoresist, it would have been obvious to one of ordinary skill in the art to prepare the photoresist composition of Barclay et al choosing the optimize the amount of photospeed control agent (base additive) in the manner and amount taught by Thackeray et al to achieve the aforementioned advantages, with reasonable expectation of achieving a photoresist composition exhibiting in increased plasma etch resistance, improved substrate adhesion, and the formation of highly resolved relief images.

4. Claims 25-28 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barclay et al in view of Feiring et al (WO 00/67072).

Barclay et al has been discussed above. Barclay et al discusses that the norborene groups may be substituted by non-hydrogen substituents such including groups containing halogens. However, the Barclay et al reference fails to specifically teach a fluorinated alcohol substituent.

Feiring et al disclose a photoresist composition for microlithography in the UV region. The fluorine-containing copolymer a repeat unit derived from at least one ethylenically unsaturated compound characterized in that at least one ethylenically unsaturated is polycyclic. Suitable cyclic moieties include norborene groups. The fluorine group is a fluoroalcohol group, and polymers containing repeat units having these groups exhibit improved development and imaging characteristics (see page 3, line 33 to page 5, line 37 page 9, page 13, and page 14, lines 3-9).

Given the teachings of the Feiring et al reference and the teaching of Barclay et al that the norborene groups may be substituted with groups containing halogens, it would have been obvious to one of ordinary skill in the art to prepare the material of Barclay et al choosing to substitute the norborene groups with a fluorinated alcohol as taught by Feiring et al to improve development and imaging characteristics, with reasonable expectation of achieving a material having increased plasma etch resistance, improved substrate adhesion, and the formation of highly resolved relief images.

5. Claims 25, 26, 28, and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barclay et al in view of Thackeray et al and Feiring et al.

All three references have been discussed above. Although the present claims have been rejected under Barclay et al in view of Feiring et al alone, they are alternatively rejected under Barclay et al in view of Thackeray et al and Feiring et al.

Given the teachings of the Feiring et al reference and the teaching of Barclay et al that the norborene groups may be substituted with groups containing halogens, it would have been obvious to one of ordinary skill in the art to prepare the material of Barclay et al in view of Thackeray et al choosing to substitute the norborene groups with a fluorinated alcohol as taught by Feiring et al to improve development and imaging characteristics, with reasonable expectation of achieving a material having increased plasma etch resistance, improved substrate adhesion, and the formation of highly resolved relief images.

Allowable Subject Matter

6. The following is a statement of reasons for the indication of allowable subject matter:

Claims 19, 50, 51, and 53-55 are indicated as containing allowable subject matter. The prior art of record fails to teach or suggest to one of ordinary skill in the art to prepare a photoresist composition as described by the present claims 19, 50, and 51 wherein the PAG is present in an amount of at least about 6% by weight.

Response to Arguments

7. Applicant's arguments filed 1/14/2003 have been fully considered but they are not persuasive.

Applicant has argued that the Barclay reference fails to specifically suggest selecting the molar ratio of the base to the photoacid generator to be in a particular range so as to ensure that the photoresist composition exhibits a micron or submicron linewidth variation when exposed to radiation. Applicant has argued that the examiner has used hindsight in her reasoning of why the Barclay reference meets the present claim limitations. As discussed by the examiner in the

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previous office action, the examples of the reference employ the PAG (triphenylsulfonium triflate) and the base additive (triisopropanol amine) in amounts of 0.52 wt % and 0.03 wt % respectively. When calculated, the molar concentration ratio of the 2 compounds in the example is about 0.1. However, despite the fact that there is no broader teaching of the amount of PAG to be added, the reference clearly teaches that the base may be added in an amount of from 0.03-5 wt %. Thus, since the base is employed in an amount equal to the lowest endpoint of the clearly taught suitable range of addition, it would have been obvious to one of ordinary skill in the art to use any amount within the taught range up to the highest endpoint. Thus keeping the amount of the PAG the same, the molar concentration ratio range based upon the broadest teaching of the base would be about 0.1 to about 20 which would meet the limitations of the present claims which require that the ratio be about 0.5, 0.6, or 1, and the limitation of the present claim 20 requiring that the molar concentration ratio is less than about 1. The examiner maintains her rejection as the reference teaches an amount of PAG and a clear range of addition amount of the base which when calculated meets the present claim limitations for the molar concentration ratio.

With respect to applicant's arguments that the Barclay and Thackeray references are not concerned with minimizing line edge roughness of a photoresist composition upon exposure to radiation, the prima facie case of obviousness is not undermined simply because applicant's motivation for teaching to add the compound (s) to the material differs from that of the prior art's motivation. In re Dillon, 919 F.2d 688, 692-93, 16 USPQ2d 1897, 1901 (Fed. Cir. 1990) (in banc), cert. Denied, 500 U.S. 904 (1991).

Additionally, applicant submitted an affidavit. The examiner has considered this evidence but does not find it persuasive as applicant has not shown enough points across the range to

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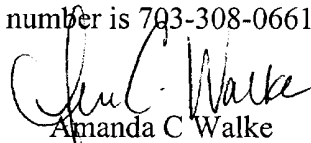
demonstrate that unexpected results are achieved across the entire claimed range and that points outside of the range do not provide the same superior results. Specifically, applicant has shown points just outside and within the range at the low end of the claimed range, but the examples only go to a ratio of 0.802 when the claimed range is 0.2 to 1.5. What about ratios from 0.802 to 1.5 and ratios outside of the upper end of the range? In order to be persuasive, applicant must show that the unexpected results are achieved across the entire claimed range

All rejections are based upon the Barclay et al reference, thus the examiner maintains her rejections for the reasons described above.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amanda C Walke whose telephone number is 571-272-1337. The examiner can normally be reached on M-R 5:30-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1321. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.


Amanda C Walke
Examiner
Art Unit 1752

ACW
December 15, 2003